WORLD ORGANIZATION FOR INTELLECTUAL PROPERTY
International Office
International application published according to the Patent Cooperation Treaty (PCT)
INTERNATIONAL PUBLICATION NUMBER WO 03/060336 A1

Int. Cl.[7]:	F 16B 21/02
International Filing No.:	PCT/EP02/14271
International Filing Date:	December 14, 2002
International Publication Date:	July 24, 2003
Filing Language:	German
Publication Language:	German
Priority	
Date:	December 29, 2001
Country:	DE
No.:	10164441.8
Designated States (national):	BR, CZ, HU, JP, KR, PL, US
Designated States (regional):	European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SI, SK, TR)

FIXING ELEMENT FOR INSERTION INTO AN OBLONG HOLE OF A CARRIER PLATE

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The invention relates to fixing elements consisting of plastic with a foot part for insertion into an oblong hole of a carrier plate, which foot part consists of a head corresponding to the edge of the oblong hole and of a shaft adapted to the width of the oblong hole, and which fixing element can be locked in the oblong hole after the insertion of the head by a quarter turn under elastic deformation of the shaft. The shaft consists of a middle strut connecting the head to the fixing element, which strut has the width of the oblong hole and on each of the two edges of which a shank is formed at a right angle and in opposite directions in such a manner that they are elastically bent towards the middle strut during the screwing in of the shaft through the edge of the oblong hole and after a quarter turn they rise back up again into their original position as a consequence of the elastic return force of the plastic and thus oppose a rotation in the opposite direction.

Such fixing elements are known from US-A-4,981,405. The designing of the fixing elements with two shanks formed on a shaft at a right angle and in opposite directions opposes a certain resistance to a turning of the fixing elements opposite the direction of screwing that reduces the risk of an unintentional loosening of the fixing elements in an advantageous manner.

Other fixing elements with formed-on shanks are known from US-A-4,375,879 and US-A-4,705,442.

DE 1 181 007 describes a fixing element of this type designed as a screw and nut in which the nut shaft that can be inserted into the oblong hole has a width corresponding to the width of the oblong hole and has stop faces running parallel to the screw axis. These stop faces work together with corresponding faces in the oblong hole so that a rotation of the nut is prevented when the screw is tightened. This nut can be readily slackened back again after the screw has been loosened and then can be withdrawn through the oblong hole.

Furthermore, there are fixing elements with a foot part of the above-cited type comparable to the nut and provided with a similarly designed shaft. However, since this foot part is not screwed down, there is the danger that the fixing element can become loose again by an unintended rotary movement.

The invention has the problem of indicating fixing elements of the type initially cited that are distinguished by an especially firm seat.

This problem is solved in accordance with the invention for a fixing element of the type initially cited on the one hand in that the head comprises pressing ramps on its two outer ends that extend during screwing in over the edge of the oblong hole and in that other shanks are formed on the free ends of the shanks.

This problem is solved on the other hand in accordance with the invention for a fixing element of the type initially cited in that the head comprises pressing ramps on its two outer ends

that extend during screwing in over the edge of the oblong hole and in that a countershank is formed in the opposite direction on each of the two edges of the middle strut.

The providing of the pressing ramps and of the other shanks and countershanks results in an especially firm seat since the fixing element is firmly connected to a carrier plate by the pressing ramps after rotation in the direction of screwing in and since an especially great resistance is opposed to an undesired rotation of the fixing elements in accordance with the invention counter to the direction of screwing in by the other shanks and countershanks.

Further advantageous embodiments of fixing elements of the invention are indicated in the dependent claims. Two special exemplary embodiments of fixing elements of the invention are explained in detail in the following with reference made to the figures in the drawings.

Figure 1 shows a fixing element with foot part for anchoring in an oblong hole in a side view.

Figure 2 shows a section through the shaft with a view onto the head inserted in the oblong hole.

Figure 3 shows the same section through the shaft during the rotation.

Figure 4 shows the same section through the shaft after a completed quarter turn.

Figure 5 shows another fixing element with another shaft design for connecting two plates in section.

Figure 6 shows the same fixing element in a side view.

Figure 7 shows a section through the shaft with a view onto the head inserted in the oblong hole.

Figure 8 shows the same section through the shaft during the rotation.

Figure 9 shows the same section through the shaft after a completed quarter turn.

The fixing element shown in Figures 1 to 4 consists of upper part 1 for holding long structural components such as, e.g., cable bundles in a clamping manner and of foot part 3 formed on its bottom plate 2 in a one-piece manner that is designed to be inserted into oblong hole 4 of a carrier plate. Foot part 3 comprises head 5 adapted in its outer contour to edge 6 of the oblong hole and shaft 7 with the same width as the oblong hole. Head 5 can be locked after having been inserted into oblong hole 4 by a quarter turn under elastic deformation of shaft 7.

To this end head 5 comprises pressing ramps 8 on its two outer ends that slide during screwing in over edge 6 of the oblong hole onto the back side of the carrier plate. Bottom plate 2 is slightly curved for this purpose and flexes upward to such an extent during the pressing of the lowest support ribs 9 that pressing ramps 8 can slide under the carrier plate.

Shaft 7 consists according to the invention of a middle strut 10 connecting head 5 to bottom plate 2. Shanks 12 are formed in a right angle and in opposing directions on the two edges 11 in such a manner that they are elastically bent toward middle strut 10 during the screwing in of shaft 7 through edge 6 of the oblong hole (see Figures 3 and 8) and after the quarter turn they rise up again into their original position as a consequence of the elastic return force of the plastic (see Figures 4 and 9). If shaft 7 is to be turned in the opposite direction, this is impossible without damaging shaft 7 since shanks 12 cannot be pressed together and also cannot otherwise yield.

In addition, in the exemplary embodiment according to Figures 1 to 4, two other shanks 13 of the length of middle strut 10 are formed on the free ends of elastically deformable shanks 12 parallel to middle strut 10. These shanks have shoulders 14 again running in opposite directions on their free ends, the length of which shoulders is equal to the interval between middle strut 10 and shanks 13 running parallel to it. This assures that shanks 12 are clamped in after quarter turn V between middle strut 10 and edge 6 of oblong hole 4 and that elastically deformable shank 12 cannot yield laterally.

In the exemplary embodiment according to Figures 5 and 6, a fixing element for connecting two plates is shown with rotary handle 15 and resiliently yielding support screen 16 on whose bottom plate 17 another shaft variant is formed.

In this shaft a countershank 18 is formed in opposite directions on free edges 11 of middle strut 10. Interval "A" of both shanks 12 and of countershanks 18 corresponds to width "B" of oblong hole 4, and countershank 18 is approximately twice as thick as elastically deformable shank 12. In order to reinforce the supporting contact of elastic shank 12, a shoulder 19 is also formed at a right angle on its free end, just as in the case of shanks 13 in Figure 2.